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DESCRIPTION

Roll of packaging material, packaging machine using the roll of packaging material and product handling system comprising the packaging machine

Technical Field

The present invention relates to a roll of packaging material mainly for use in packaging a product to be mass produced, a packaging machine that performs packaging using the roll of packaging material, and a product handling system comprising the packaging machine.

Background Art

A bag forming and packaging machine is conventionally a sanitary and labor-saving machine without requiring much human effort in handling packaging material. There are two types for this bag forming and packaging machine, i.e., a horizontal pillow type bag forming and packaging machine and a vertical pillow type bag forming and packaging machine.

As for the horizontal pillow type bag forming and packaging machine, pieces to be packaged are horizontally supplied into the machine, and pillow type (pillow-shaped) bags are horizontally produced, while the supplied pieces to be packaged are packaged into the bags.

As for the vertical pillow type bag forming and packaging machine, on the other hand, pieces to be packaged are vertically supplied by means of gravity, and pillow type (pillow-shaped) bags are vertically produced, while the supplied pieces to be packaged are packaged into the bags.

The horizontal and vertical pillow type bag forming and packaging machines, being capable of producing bags with a film roll wound with a film of long length while successively packaging pieces to be packaged (products), are mainly used for products to be mass produced.

In recent years, however, enterprises and the like manufacturing the products are demanding a speed increase in the bag forming and packaging machine for improved productivity, along with shortened downtime during which the manufacture of products is stopped. In other words, for the purpose of improving the total productivity, the enterprises wish for further improvement in productivity, not merely by increasing the speed of the bag forming and packaging machine but also by shortening the downtime during which the product manufacture is always stopped for a given condition.

The downtime in the bag forming and packaging machine occurs, for example, during an exchange of film rolls, the packaging material, or setting of packaging conditions. More specifically, in order to exchange film rolls, the operator mounts a new film roll in the bag forming and packaging

machine, brings the machine into actual operation, and finds out optimum packaging conditions. Then, the operator manually inputs the found packaging conditions to the bag forming and packaging machine to make advance registration. After that, the operator operates the bag forming and packaging machine to manufacture products according to the registered packaging conditions.

In this manner, the conventional bag forming and packaging machine requires a great deal of time in exchanging film rolls and setting packaging conditions. Moreover, the loss of films used for finding out optimum conditions in exchanging film rolls and setting packaging conditions greatly depend on the skill of the operator: in the case of an unskilled operator, additional loss of time and film loss are produced if he finds out erroneous packaging conditions.

In addition to shortened downtime, the enterprises desire to know the result of a total production increase in real time for clearly establishing guidelines for the next production.

A product handling system using the conventional bag forming and packaging machine, however, does not allow them to know the production result in real time. For example, with the conventional product handling system, the operator writes down in a daily report or the like the number of products (packaging number) he produced by operating the bag forming

and packaging machine, number of defective pieces, operating time and the like. For this reason, problems such as delay in communicating the production result and errors in the written information are occurring.

Disclosure of Invention

It is an object of the present invention to provide a roll of packaging material with which the shortening of downtime is easily achieved, and real-time production management is provided.

It is another object of the present invention to provide a packaging machine with which the shortening of downtime is easily achieved, and real-time production management is provided.

Still another object of the present invention is to provide a product handling system using the packaging machine with which the shortening of downtime is easily achieved, and real-time production management is provided.

A roll of packaging material according to one aspect of the present invention comprises: a wound strip of packaging material for use in packaging a product; and a recording medium provided on the wound strip of packaging material, and readably recording packaging related information.

In the roll of packaging material according to the invention, the recording medium is provided on the wound strip

of packaging material for use in packaging the product. This recording medium contains the packaging related information readably recorded.

In this case, since the packaging related information is recorded in the recording medium of the roll of packaging material, optimum packaging related information can be set in a short time at the time of exchange of rolls of packaging material, regardless of the operators skill. This prevents an unskilled operator from setting erroneous information and producing additional time loss and packaging material loss.

The packaging related information may include a packaging condition for packaging the product using the strip of packaging material.

In this case, since the packaging condition is recorded in the recording medium of the roll of packaging material, an optimum packaging condition can be set in a short time at the time of exchange of rolls of packaging material regardless of the operators skill. This prevents an unskilled operator from setting an erroneous packaging condition and producing additional time loss and packaging material loss.

The packaging related information may include information related to a material of the strip of packaging material.

In this case, since the information related to the material of the strip of packaging material is recorded in

the recording medium of the roll of packaging material, the details of packaging related information can be set in a short time at the time of exchange of rolls of packaging material according to the information related to the material of the packaging material, regardless of the operators skill. This prevents an unskilled operator from setting erroneous information and producing additional time loss and packaging material loss.

The packaging related information may include information related to the fabrication of the strip of packaging material.

In this case, since the information related to the fabrication of the strip of packaging material is recorded in the recording medium of the roll of packaging material, the details of packaging related information can be set in a short time at the time of exchange of rolls of packaging material according to the information related to the fabrication of the packaging material, regardless of the operators skill. This prevents an unskilled operator from setting erroneous information and producing additional time loss and packaging material loss.

The packaging related information may include a packaging material identifier for identifying the strip of packaging material.

In this case, since the packaging material identifier

is recorded in the recording medium of the roll of packaging material, the strip of packaging material can be identified by the packaging material identifier at the time of exchange of rolls of packaging material. The packaging related information can thus be set based on the packaging material identifier. The operator can thus set optimum packaging related information in a short time regardless of his skill. This prevents an unskilled operator from setting erroneous information and producing additional time loss and packaging material loss.

The packaging related information may include a product identifier for identifying the product to be packaged.

In this case, since the product identifier is recorded in the recording medium of the roll of packaging material, a product to be packaged is made known by the product identifier at the time of exchange of rolls of packaging material. The packaging related information can thus be set based on the product identifier. The operator can thus set optimum packaging related information in a short time regardless of his skill. This prevents an unskilled operator from setting erroneous information and producing additional time loss and packaging material loss.

The recording medium may include a non-contact recording medium readable in a non-contact fashion.

In this case, the packaging related information is

readably recorded in the recording medium in a non-contact fashion. This makes it possible to easily read the packaging related information without contacting the recording medium of the roll of packaging material.

The recording medium may include a contact recording medium readable in a contact fashion.

In this case, the packaging related information is readably recorded in the recording medium in a contact fashion. This makes it possible to reliably read the packaging related information by contacting the recording medium of the roll of packaging material.

The wound strip of packaging material may have a hollow core, the recording medium being provided near the hollow core of the strip of packaging material.

In this case, the recording medium is provided near the hollow core of the wound strip of packaging material. Accordingly, when a reading device is provided on a support shaft of the roll of packaging material provided in the packaging machine, recorded contents of the recording medium can easily be read by inserting the hollow core of the roll of packaging material into the support shaft at the time of exchange of rolls of packaging material.

The recording medium may be provided at an end of or near an end of the outermost periphery of the wound strip of packaging material.

In this case, since the recording medium is provided at an end of or near an end of the outermost periphery of the wound strip of packaging material, the recorded contents can be easily read with the reading device at the time of exchange of rolls of packaging material.

The recording medium may be provided on a sheet-like member that affixes an end of the outermost periphery of the wound strip of packaging material.

In this case, since the recording medium is provided on the sheet-like member that affixes an end of the outermost periphery of the wound strip of packaging material, the recorded contents can be easily read with the reading device at the time of exchange of rolls of packaging material.

A roll of packaging material according to another aspect of the present invention comprises: a wound strip of packaging material for use in packaging a product; and an identification medium provided on the wound strip of packaging material for identifying packaging related information.

The roll of packaging material according to the invention is wound with the strip of packaging material for use in packaging the product, the wound strip of packaging material being provided with the identification medium for identifying the packaging related information.

In this case, since the information related to product-packaging is identified by the identification medium

provided on the wound strip of packaging material, the operator is not required to input the information related to product-packaging at the time of exchange of rolls of packaging material. This prevents wasteful time loss due to an erroneous setting condition made by the operator, and the like.

The identification medium may be a metal representing the packaging related information on the basis of a state of the metal in the roll of packaging material.

In this case, since the contained metal represents the packaging related information, the packaging related information can be easily read with the reading device at the time of exchange of rolls of packaging material.

A packaging machine according to still another aspect of the present invention for packaging a product using a roll of packaging material comprising a recording medium that readably records packaging related information, comprises: a reading device that reads the packaging related information recorded in the recording medium; and a packaging unit that packages the product using the roll of packaging material based on the packaging related information read by the reading device.

In the packaging machine according to the invention, the packaging related information recorded in the recording medium of the roll of packaging material is read by the reading

device, and the product is packaged by the packaging unit according to the read information.

In this case, since the packaging related information recorded in the recording medium of the roll of packaging material is read by the reading device, optimum packaging related information can be set in a short time at the time of exchange of rolls of packaging material, regardless of the operators skill. This prevents an unskilled operator from setting erroneous information and producing additional time loss and packaging material loss.

The packaging related information may include a packaging condition for packaging the product, the reading device may read the packaging condition recorded in the recording medium for packaging the product, and the packaging unit may package the product according to the packaging condition read by the reading device.

In this case, since the packaging condition recorded in the recording medium of the roll of packaging material is read by the reading device, an optimum packaging condition can be set in a short time at the time of exchange of rolls of packaging material, regardless of the operators skill. This prevents an unskilled operator from setting erroneous information and producing additional time loss and packaging material loss.

The packaging related information may include a

packaging material identifier for identifying the roll of packaging material, the packaging machine further comprising a storage device that stores beforehand other packaging related information for each packaging material identifier, the reading device reading the packaging material identifier recorded in the recording medium, the packaging unit selecting the other packaging related information stored beforehand in the storage device corresponding to the packaging material identifier read by the reading device to package the product.

In this case, since the packaging related identifier recorded in the recording medium of the roll of packaging material is read by the reading device, optimum other packaging related information stored beforehand in the storage device can be set according to the packaging material identifier in a short time at the time of exchange of rolls of packaging material, regardless of the operators skill. This prevents an unskilled operator from setting erroneous information and producing additional time loss and packaging material loss.

The packaging related information may include a product identifier for identifying a product to be packaged, the packaging machine further comprising a storage device that stores beforehand other packaging related information for each product identifier, the reading device reading the

product identifier recorded in the recording medium, the packaging unit selecting the other packaging related information stored beforehand in the storage device corresponding to the product identifier read by the reading device to package the product.

In this case, since the product identifier recorded in the recording medium of the roll of packaging material is read by the reading device, optimum other packaging related information stored beforehand in the storage device can be set according the product identifier in a short time at the time of exchange of rolls of packaging material, regardless of the operators skill. This prevents an unskilled operator from setting erroneous information and producing additional time loss and packaging material loss.

The reading device may include a non-contact reading device capable of reading contents of the recording medium in a non-contact fashion.

In this case, contents of the recording medium can be easily read by the reading device in a non-contact fashion.

The reading device may include a contact reading device capable of reading contents of the recording medium in a contact fashion.

In this case, contents of the recording medium can be reliably read by the reading device in a contact fashion.

A packaging machine according to yet another aspect of

the present invention for packaging a product using a roll of packaging material comprising an identification medium for identifying packaging related information, comprises: a reading device that reads the packaging related information from the identification medium; and a packaging unit that packages the product using the roll of packaging material based on the packaging related information read by the reading device.

In the packaging machine according to the invention, the packaging related information is read from the identification medium by the reading device, and the product is packaged by the packaging unit using the roll of packaging material based on the packaging related information read by the reading device.

In this case, since the packaging related information recorded in the identification medium is read by the reading device, optimum other packaging related information stored beforehand in the storage device can be set in a short time according to the packaging related information, regardless of the operators skill. This prevents an unskilled operator from setting erroneous information and producing additional time loss and packaging material loss.

A product handling system according to still another aspect of the present invention comprises: a packaging machine that packages a product using a roll of packaging

material having a recording medium that readably records a product identifier for identifying the product to be packaged; a handling device that operates together with the packaging machine to handle the product; an operating condition recording device that associates beforehand product identifiers with operating conditions of the handling device for recording; and a communication device, the packaging machine comprising: a reading device that reads a product identifier stored in the recording medium; a storage device that stores beforehand packaging related information for each product identifier; and a packaging unit that selects the packaging related information stored beforehand in the storage device corresponding to the product identifier read by the reading device to package the product, the communication device selecting an operating condition recorded in the recording medium corresponding to the product identifier read by the reading device to supply the selected operating condition to the handling device, the handling device operating based on the operating condition supplied from the communication device.

In the product handling system according to the invention, the product identifier for identifying the product to be packaged is readably recorded in the recording medium of the roll of packaging material. In addition, the packaging related information for each product identifier is stored

beforehand in the storage device of the packaging machine. Moreover, the product identifiers and the operating conditions of the handling device are associated with each other beforehand by the operating condition recording device and recorded.

This packaging machine packages the product using the roll of packaging material with the recording medium. The product identifier recorded in the recording medium of the roll of packaging material is read by the reading device, and the packaging related information stored beforehand in the storage device is selected by the packaging unit based on the read product identifier. Then, an operating condition recorded in the recording medium is selected by the communication device according to the product identifier, and the selected operating condition is supplied to the handling device operating together with the packaging machine. The handling device handles the product based on the operating condition supplied from the communication device.

In this case, the operator does not need to input a setting condition to the handling device handling the product by operating together with the packaging machine. This prevents wasteful time loss due to an erroneous setting condition made by the operator, and the like.

The handling device may supply the packaging machine with a history of operations based on the operating condition

as history information, the packaging machine making the recording medium record the history information.

In this case, the handling device supplies the packaging machine with the history of operations according to the operating condition as the history information, and the packaging machine makes the recording medium record the history information. This enables the manager to grasp in real time the history information, such as the number of products (packaging number) he produced by operating the packaging machine, number of defective pieces, and operating time, and also to make plans for improving productivity, and easily pursue the causes of troubles.

The manager can also prevent problems such as delay in communicating the production result or errors in recited information.

A product handling system according to yet another aspect of the present invention comprises: a packaging machine that packages a product using a roll of packaging material having an identification medium for identifying a product identifier of a product to be packaged; a handling device that operates together with the packaging machine to handle the product; an operating condition recording device that associates beforehand product identifiers with operating conditions of the handling device for recording; and a communication device, the packaging machine comprising:

a reading device that reads a product identifier from the identification medium; a storage device that stores beforehand packaging related information for each product identifier; and a packaging unit that selects the packaging related information stored beforehand in the storage device based on the product identifier read by the reading device to package the product, the communication device selecting an operating condition recorded in the identification medium corresponding to the product identifier read by the reading device to supply the selected operating condition to the handling device, the handling device operating based on the operating conditions supplied from the communication device.

In the product handling system according to the invention, the product identifier for identifying the product to be packaged is provided so that it can be read from the identification medium of the roll of packaging material. In addition, the packaging related information for each product identifier is stored beforehand in the storage device of the packaging machine. Moreover, the product identifiers and the operating conditions of the handling device are associated beforehand with each other by the operating condition recording device and recorded.

This packaging machine packages the product using the roll of packaging material with the identification medium. The product identifier is read from the identification medium

of the roll of packaging material by the reading device, and the packaging related information stored beforehand in the storage device is selected by the packaging unit based on the read product identifier. Then, an operating condition recorded in the identification medium corresponding to the product identifier is selected by the communication device, and the selected operating condition is supplied to the handling device operating together with the packaging machine. The handling device handles the product based on the operating condition supplied from the communication device.

In this case, the operator does not need to input a setting condition to the handling device handling the product by operating together with the packaging machine. This prevents wasteful time loss due to an erroneous setting condition made by the operator, and the like.

Brief Description of Drawings

Fig. 1 is a schematic diagram of a product handling system comprising a bag forming and packaging machine according to an embodiment of the present invention;

Fig. 2 is a block diagram showing an example of the product handling system of Fig. 1;

Fig. 3 is an elevation view showing the details of the belt conveyor, weighing unit, and bag forming and packaging

unit of Fig. 1;

Fig. 4 is a perspective view showing bag forming and packaging by the vertical pillow type bag forming and packaging apparatus;

Figs. 5a to 5g are diagrams showing the details of the film roll and the housing unit of the vertical pillow type bag forming and packaging apparatus housing the film roll;

Fig. 6 is a schematic diagram showing manufacturing steps of the film roll;

Fig. 7 is a block diagram showing the structure of the computer provided inside the vertical pillow type bag forming and packaging apparatus of the bag forming and packaging unit of Fig. 1;

Fig. 8 is a diagram showing an example of the parameters recorded in the recording medium of the film roll;

Fig. 9 is a flowchart showing the operation of the computer of the vertical pillow type bag forming and packaging apparatus using the film roll shown in Fig. 7;

Fig. 10 is a diagram showing parameters related to a bag forming and packaging program recorded in the recording medium of the film roll and the computer of the vertical pillow type bag forming and packaging apparatus;

Fig. 11 is a flowchart showing the operation of the computer of the vertical pillow type bag forming and packaging apparatus in the bag forming and packaging unit, using the

film roll shown in Fig. 10;

Fig. 12 is a diagram showing another example of parameters related to a bag forming and packaging program recorded in the recording medium of the film roll and the computer of the vertical pillow type bag forming and packaging apparatus;

Fig. 13 is a flowchart showing the operation of the computer of the vertical pillow type bag forming and packaging apparatus, using the film roll shown in Fig. 12;

Fig. 14 is a diagram showing another example of parameters related to a bag forming and packaging program recorded in the recording medium of the film roll;

Fig. 15 is a flowchart showing the operation of the computer of the vertical pillow type bag forming and packaging apparatus, using the film roll shown in Fig. 14; and

Figs. 16a and 16b are diagrams showing other examples of the film roll having the recording medium attached thereon.

Best Mode for Carrying Out the Invention

Description will, hereinafter, be made of a film roll as an example of a roll of packaging material according to the present invention, a bag forming and packaging machine using the film roll, and a product handling system comprising the bag forming and packaging machine.

Fig. 1 is a schematic diagram of a product handling

system comprising a bag forming and packaging machine according to an embodiment of the present invention, and Fig. 2 is a block diagram showing an example of the product handling system of Fig. 1.

The product handling system shown in Figs. 1 and 2 includes a manufacturing unit 10 for pieces to be packaged, a weighing unit 11, a bag forming and packaging unit 12, an inspector 13, a case packer (cardboard caser) 14, a labeling unit 15, and belt conveyors 16, 17.

A film roll 100 is mounted in the bag forming and packaging unit 12. The inspector 13 includes a weight checker 13a, a seal checker 13b, a metal detector 13c, and an X-ray inspector 13d.

The manufacturing unit 10 manufactures pieces to be packaged (contents of products). The pieces to be packaged manufactured by the manufacturing unit 10 are transported by the belt conveyor 17 to the weighing unit 11. The transported pieces to be packaged are sorted according to each certain weight by the weighing unit 11. The weighing unit 11 will later be detailed.

The pieces to be packaged thus sorted are supplied to the bag forming and packaging unit 12. The bag forming and packaging unit 12 produces bags using the mounted film roll 100, and packages the pieces sorted according to each certain weight into the bags. The bag forming and packaging unit 12

will later be described.

The pieces packaged in the bags are subsequently transported to the inspector 13. The inspector 13 performs given inspections of the pieces packaged in the bags, with each function of the weight checker 13a, seal checker 13b, metal detector 13c, and X-ray inspector 13d in the inspector 13.

The weight checker 13a, for example, measures the weight of each bag containing the pieces packaged to inspect if the bag containing the pieces packaged satisfies a given weight, the seal checker 13b inspects if a seal (binding margin) of the bag containing the pieces packaged is completely bonded, the metal detector 13c inspects if any contaminants such as metal pieces are present in the bag containing the pieces packaged, and the X-ray inspector 13d inspects with X-rays if any impurities are included in the bag containing the pieces packaged.

After the given inspections by the inspector 13, the bags containing the pieces packaged are transported by the belt conveyor 16 to the case packer (cardboard caser) 14. The bags containing the pieces packaged will hereinafter be called the products.

A given number of products are stored in each given vessel (for example, cardboard box) with the function of the case packer 14. Vessels storing the products are then

transported to the labeling unit 15. The labeling unit 15 affixes a given label to each vessel storing the products. The label recites, for example, where to deliver the products, expiration, and transportation related information. Vessels storing the products are subsequently transported to a delivery step to be delivered to a client according to the information recited on each label.

Now refer to Fig. 3 which is an elevation view showing the details of the belt conveyor 17, weighing unit 11, and bag forming and packaging unit 12 of Fig. 1.

The weighing unit 11 shown in Fig. 3 is composed of a weighing apparatus 200. The weighing apparatus 200 has a plurality of meters (hereinafter called weighing hoppers) 220, a plurality of combination vessels (hereinafter called combination hoppers) 230, and a collection unit 240.

The bag forming and packaging unit 12 shown in Fig. 3, on the other hand, is composed of a vertical pillow type bag forming and packaging apparatus 300. The vertical pillow type bag forming and packaging apparatus 300 has a computer 1 (Fig. 7). The computer 1 will later be detailed.

A support shaft 301 in the vertical pillow type bag forming and packaging apparatus 300 carries a film roll 100. The support shaft 301 and the film roll 100 will later be described. The vertical pillow type bag forming and packaging apparatus 300 is supported by a frame 60, and above the

vertical pillow type bag forming and packaging apparatus 300 is provided the belt conveyor 17 and the weighing apparatus 200.

The pieces to be packaged are initially supplied into the weighing apparatus 200 of the weighing unit 11 by the belt conveyor 17. The weighing apparatus 200 performs combination weighing of pieces to be packaged with each function of the plurality of weighing hoppers 220 and the plurality of combination hoppers 230 to sort them according to each certain weight. The pieces to be packaged thus sorted are then supplied through the collection unit 240 to a collection chute 22 of the vertical pillow type bag forming and packaging apparatus 300 in the bag forming and packaging unit 12.

In the vertical pillow type bag forming and packaging apparatus 300 of the bag forming and packaging unit 12, a film is supplied from the film roll 100 through a plurality of guides 30 to a lower part of the collection chute 22.

Now refer to Fig. 4 which is a perspective view showing bag forming and packaging by the vertical pillow type bag forming and packaging apparatus 300.

As shown in Fig. 4, the vertical pillow type bag forming and packaging apparatus 300 includes a sailor 17, a cylinder 18, a vertical sealing mechanism (sealing jaw) 19, a pair of pull-down belts 20, a horizontal sealing mechanism (sealing jaw) 21, and a collection chute 22.

In the vertical pillow type bag forming and packaging apparatus 300, the film passes through a gap between the sailor 17 and the cylinder 18 to be formed into a tubular shape. The tubular-formed film is transported by the pair of pull-down belts 20 between the cylinder 18 and the pair of pull-down belts 20 so that both side edges of the film overlapped by the vertical sealing mechanism 19 are vertically bonded. This vertically bonded portion is also called a center seal.

The vertically bonded tubular film is then horizontally bonded by the horizontal sealing mechanism 21, and simultaneously, the pieces to be packaged pass through the inside of the collection chute 22 and cylinder 18 to be packaged in the tubular film. Then, the film containing the pieces packaged is transported by the pair of pull-down belts 20, horizontally bonded and cut by the horizontal sealing mechanism 21, which results in the production of a bag 25 containing the pieces sealed.

Figs 5a to 5b are diagrams showing the details the film roll 100 and a housing unit 310 of the vertical pillow type bag forming and packaging apparatus 300 that houses the film roll.

As shown in Fig. 5a, the housing unit 310 is mainly composed of a stop plate 311 and a columnar support shaft 301.

Fig. 5a shows a state before the film roll 100 is mounted

around the support shaft 301, Fig. 5b shows a cross section of the film roll 100 and the support shaft 301 immediately after the film roll 100 has been mounted around the support shaft 100, and Fig. 5c shows a cross section of the film roll 100 and the support shaft 301 with the film roll of Fig. 5b being held by the support shaft 301.

As shown in Fig. 5b, a paper tube (hollow core) 101 of the film roll 100 is fitted into the support shaft 301 of the vertical pillow type bag forming and packaging apparatus 300.

Next, as shown in Fig. 5c, a holder 304 for holding the film roll 100 projects outwardly from the support shaft 301 to abut the inside face of the film roll 100, thereby holding the film roll 100.

Description is now made of a technique of a recording medium reading device 302 of the vertical pillow type bag forming and packaging apparatus 300, for reading packaging related information from the recording medium 110 of Fig. 5a and Figs. 5d to 5f or from an identification medium 111 carried by the film roll 100. While five techniques (first to five techniques) are described below as the techniques for reading packaging related information, any of the techniques may be adopted in the bag forming and packaging device 300. The recording medium reading device 302 reads recorded contents of the recording medium 110 carried by the film roll 100, and the identification medium reading device 305 is located in

the housing unit 310 that houses the film roll 100 so that it may read recorded contents of the identification medium 111 provided on the film roll 110. For this reason, the following description will mainly be given of the structure of the housing unit 310 with reference to drawings.

Note that the recording medium 110 has packaging related information recorded, and the identification medium 111 includes identifying information which enables identification of the packaging related information.

(First Technique)

Firstly, a first technique for reading packaging related information will be described. Fig. 5a is a diagram showing the structure of a housing unit 310 and a film roll 100 using the first technique.

The support shaft 301 in the housing unit 310 is provided with a rotator 303 capable of rotating independently in a circumferential direction of the support shaft 301. The rotator 303 is provided with a tag reader 302a as a recording medium reading device 302. A plurality of holders 304 serving as members for holding the film roll 100 are also provided on the surface corresponding to the circumference of the support shaft. Instead of the rotator 303, the support shaft 301 may be provided so that it can rotate around its center axis relative to the stop plate 311.

A plate-like ID (identifier) tag (hereinafter,

"plate-like tag") 110a is, on the other hand, attached as the recording medium 110 on the inside surface of the paper tube 101 of the film roll 100. The plate-like tag 110a is composed of an antenna and an IC (Integrated Circuit) chip, for example, and is an information storage medium capable of electromagnetically storing data. The plate-like tag 110a of this embodiment records packaging related information (packaging conditions, information related to film material, information related to film processing, an identifier for film identification, an identifier for identification of products to be packaged, and others). This plate-like tag 110a is attached as a final step in fabrication steps (described below) of the film roll 100 with the packaging related information being recorded beforehand.

The tag reader 302a is capable of reading the data recorded in this plate-like tag 110a in a non-contact fashion through a resonance phenomenon of radio waves. When the tag reader 302a reads data from the plate-like tag 110a, a radio wave of a given frequency is transmitted from the tag reader 302a. The resonance phenomenon occurs on the plate-like tag 110a which has received this radio wave of a given frequency, so that a radio wave is transmitted back from the plate-like tag 110a. The tag reader 302a can read the data by receiving this radio wave transmitted back from the plate-like tag 110a.

At the time of mounting of the film roll 100 to the

housing unit 310, the film roll 100 is moved so that its paper tube 101 may be fitted into the support shaft 301. When the film roll 100 abuts the stop plate 311 with its axial position being defined, the plurality of holders 304 project outwardly from the surface corresponding to the circumference of the support shaft 301 so as to abut the inside surface of the paper tube 101 of the film roll 100. This allows the film roll 100 to be held by the support shaft 301.

The distance between the tag reader 302a and the plate-like tag 110a, with the film roll 100 being in a held state, is such that the radio waves transmitted from them are reachable to each other. The tag reader 302a is therefore capable of detecting the plate-like tag 110a and reading the data recorded in the plate-like tag 110a. The data read from the tag reader 302a is transmitted to the computer 1.

In this manner, according to this technique, a recording medium 110 is attached on the film roll 100, and the plate-like tag 110a which electromagnetically stores data is adopted as the storage medium 110, allowing the packaging related information to be easily read from the recording medium 110 attached on the film roll 100.

Moreover, since the data is read through the radio waves in a non-contact fashion, the data can be accurately read even if the located positions of the tag reader 302a and the plate-like tag 110a do not precisely correspond with each

other. Problems such as reading errors due to print blur or surface contamination may also be prevented.

In addition, since the tag reader 302a is located on the support shaft 301, there is no need to provide a special member on which the recording medium reading device 302 is located, allowing the bag forming and packaging device 300 to be smaller in size.

Furthermore, since the plate-like tag 110a is located on the paper tube 101 of the film roll 100, even when the film roll 100 has been partly used, the paper tube 101 can read the packaging related information without any influence.

Note that this plate-like tag 110a may be embedded into the paper tube 101 in such a manner that it is not exposed to the surface of the paper tube 101 of the film roll 100. By weaving plate-like tags 110a into a strip of original paper at the time of stacking the strip of original paper for the fabrication of paper tubes 101, it is possible to embed a plate-like tag 110a into each paper tube 101. Because the tag reader 302a reads data through radio waves in a non-contact fashion, it can accurately read the data recorded in the plate-like tag 110a with the plate-like tag 110a being embedded into the paper tube 101. In this manner, the plate-like tag 110a is not exposed to the inside surface of the paper tube 101, which prevents contact of the recording medium 110 with the support shaft 301, avoiding problems of

physical damage.

(Second Technique)

Next, a second technique for reading packaging related information will be described. Fig. 5d is a diagram showing the structure of a housing unit 310 and a film roll 100 using the second technique. Since the structure and function of the housing unit 310 are almost similar to those used in the first technique described above, description will be focused on differences between them.

In this technique, a rod-like ID (identifier) tag (hereinafter, "a rod-like tag") 110b is adopted as the recording medium 110. While having a different shape, the rod-like tag 110b has in principle a similar structure and function to the plate-like tag 110a in the aforementioned first technique. The rod-like tag 110b has packaging related information recorded, as with the structure and function used in the first technique.

On the other hand, the tag reader 302b, the recording medium reading device 302 in this technique, is similar to the aforementioned tag reader 302a in structure and located position. This allows the packaging related information to be easily read from the recording medium 110 attached on the film roll 100, similarly in the first technique.

The rod-like tag 110b is attached as a final step in fabrication steps (described below) of the film roll 100 with

the packaging related information being recorded beforehand. At this time, a hole having almost an identical diameter to that of the rod-like tag 110b is formed on a side of the paper tube 101, the rod-like tag 110b being inserted into the formed hole. The rod-like tag 110b is thus located in the paper tube 101 in an embedded state so as not to be exposed to the surface of the paper tube 101 of the film roll 100. Consequently, the recording medium 110 would not come into contact with the support shaft 301 and the like, which prevents problems of physical damage.

(Third Embodiment)

A third technique for reading packaging related information will now be described. Fig. 5e is a diagram showing the structure of a housing unit 310 and a film roll 100 using the third technique. Description below will be focused on differences between this technique and the first technique.

In this technique, a ring-like ID (identifier) tag (hereinafter, "a ring-like tag") 110c having a round opening is adopted. While having a different shape, the ring-like tag 110c is in principle similar in structure and function to that of the aforementioned plate-like tag 110a or the rod-like tag 110b.

The diameter of the opening of the ring-like tag 110c coincides with the inside diameter of the paper tube 101, and

the outside diameter of the ring-like tag 110c coincides with the outside diameter of the paper tube 101. The ring-like tag 110c is attached on the side of the paper tube 101 in contact with the stop plate 311. The ring-like tag 110c is attached as a final step in fabrication steps (described below) of the film roll 100 with the packaging related information being recorded beforehand.

On the other hand, the tag reader 302c, the recording medium reading device 302 in this technique, is located not on the support shaft 301 but on the stop plate 311. More specifically, the tag reader 302c is located in such a position that it may come into contact with the paper tube 101 when the film roll 100 is mounted. As the tag reader 302c, a similar one to the aforementioned tag reader 302a may be adopted.

In such a structure, the distance between the tag reader 302c and the ring-like tag 110c, with the film roll 100 being in a held state, is such that the radio waves transmitted from them are reachable to each other. Therefore, the packaging related information can be easily read from the recording medium 110 attached on the film roll 100, as with the first technique.

Attachment of the ring-like tag 110c in this technique may be done very easy, simply by attaching it on the side of the paper tube 101. Moreover, because the tag reader 302c

is located on the stop plate 311, there is no need to provide a special member on which the recording medium reading device 302 is located, which enables the bag forming and packaging device 300 to be smaller in size.

Note that the ring-like tag 110c may be provided not only on one side of the paper tube 101 but also on both sides thereof. This enables reading of the packaging related information in a bag forming and packaging device where the support shaft 301 is located in the opposite direction to Fig. 5e, thereby enhancing the flexibility of the film roll 100.

(Fourth Technique)

A fourth technique for reading packaging related information will now be described. Fig. 5f is a diagram showing the structure of a housing unit 310 and a film roll 100 using the fourth technique. Following description will be focused on differences between this technique and the first technique.

In this technique, a label 110d with printed barcode is adopted as the recording medium 110. This label 110d is attached inside the paper tube 101 of the film roll 100. Contents to be encoded as the barcode are packaging related information. The label 110d is attached as a final step in fabrication steps (described below) of the film roll 100 with such barcode printed with a ultraviolet ink.

In this technique, a barcode reader 302d is provided on

the surface corresponding to the circumference of a rotator 303 as a recording medium reading device 302. The barcode reader 302d comprises an irradiator 303d directing ultraviolet rays and a reader 304d reading the barcode.

When a film roll 100 is mounted and held around the support shaft 301, the barcode reader 302d reads the barcode on the label 110d. At this time, the rotator 303 is initially rotated independently from the support shaft 301. Simultaneously, the irradiator 303d of the barcode reader 302d directs ultraviolet rays, causing the reader 304d to scan the inside face of the paper tube 101. When the label 110d with printed barcode is present during this scanning, the contents of the barcode are reflected by the ultraviolet rays for detection of the label 110d, and the reflected contents of the barcode are read by the reader 304d. The read contents of the barcode are transmitted to the computer 1.

In such a manner, the information can be read in a non-contact fashion from the recording medium 110 attached on the film roll 100.

Note that the contents to be printed on the label 110d may be any other information related to packaging, without limited to barcode. Two-dimensional codes such as QR (Quick Response) codes or symbols according to given rules, for example may be used. In addition, the printed contents such as barcode may be printed directly on the paper tube 101 of

the film roll 100, instead of the label 110d.

(Fifth Technique)

A fifth technique for reading packaging related information will now be described. Fig. 5g is a diagram showing the structure of a housing unit 310 and a film roll 100 using the fifth technique. Description below will be focused on differences between this technique and the first technique.

In this technique, metal powder 111a is contained in the paper tube 101, functioning as an identification medium 111. The metal powder 111a is included in an adhesive applied to a strip of original paper at the time of fabricating the paper tube 101, so that it may be contained in the entire paper tube 101. The amount of the metal powder 111a per unit volume to be contained in the paper tube 101 is varied depending on the packaging related information. In other words, the paper tube 101 contains the amount of the metal powder 111a corresponding to the packaging related information.

As for the identification medium reading device 305 in this technique, on the other hand, a metal sensor 305a is adopted. This metal sensor 305a is capable of magnetically detecting the metal powder 111a contained in the paper tube 101 in a non-contact fashion, and also comprises a transmitting coil 303e and a receiving coil 304e along with a transmitter and a sensor of which illustration is omitted.

The transmitting coil 303e and the receiving coil 304e are coaxially formed, located on the support shaft 301 as with the tag reader 302a in the aforementioned first technique.

When the metal sensor 305a detects the metal powder 111a in the paper tube 101, alternating current is supplied to the receiving coil 303e from the transmitter, which causes the transmitting coil 303e to generate an alternating magnetic field in its neighborhood space. This alternating magnetic field induces electromotive force in the receiving coil 304, resulting in the generation of alternating current. The generated alternating current is transmitted to the sensor which measures a value of the alternating current (alternating current value). The measured alternating current value is transmitted to the computer 1 as a signal.

With the film roll 100 being mounted and held around the support shaft 301, the metal powder 111a is present in the space near the transmitting coil 303 and the receiving coil 304e. With the metal powder present in the space near the transmitting coil 303e and the receiving coil 304e, a disturbance occurs in the alternating magnetic field generated from the transmitting coil 303e. This causes variations in the alternating current value to be measured by the sensor. The metal powder 111a in the paper tube 101 of the film roll 100 is thus detected.

Note that this alternating current value also

corresponds to the amount of the metal powder 111a per unit volume contained in the paper tube 101. The amount of the metal powder 111a contained in the paper tube 101 corresponds to the packaging related information, as mentioned above. Therefore, the packaging related information can be read based on this alternating current value.

The packaging related information is identified by the computer 1 based on the alternating current value transmitted from the metal sensor 305a. The storage device 506 in the computer 1 has a table stored beforehand in which the packaging related information and alternating current values are associated with each other. In reading the packaging related information, the computer 1 refers to this table based on the alternating current value.

Metal to be employed as the metal powder 111a may be a magnetic metal such as iron or a ferrite stainless steel or a non-magnetic metal such as aluminum or an austenitic stainless steel. In either case, its presence in the space near the transmitting coil 303e causes a disturbance in the alternating current magnetic field which can be detected as the metal powder 111a. Note, however, that where the material of the film is mainly composed of a non-magnetic metal such as VMPET (aluminum-evaporated polyethylene terephthalate), the use of a non-magnetic metal as the metal powder 111a makes it difficult to magnetically detect the metal powder 111a

only. In order to detect the metal powder 111a without the influence of the film material, it is therefore preferred to use a magnetic metal as the metal powder 111a.

In this manner, the packaging related information can be easily read from the identification medium 111 attached on the film roll 100.

In addition, because the metal powder 111a is adopted as the identification medium 111, identification of the type of the film roll 100 can be accomplished at a relatively lower cost than using an ID tag or the like. Furthermore, problems such as reading errors due to print blur or surface contamination may be avoided.

In this technique, the metal powder 111a can be magnetically detected in a non-contact fashion with the metal powder 111a being contained in the entire paper tube 101. Therefore, the located position of the transmitting coil 303e and the receiving coil 304e is not limited to that shown in Fig. 5g, but may be any other position in which they can detect the metal powder 111a in the paper tube 101. For example, the transmitting coil 303e and the receiving coil 304e may be located on the stop plate 311, as with the tag reader 302c in the aforementioned third technique.

In this technique, the metal powder 111a is contained as the identification medium 111 in the paper tube 101; however, instead of the metal powder 111a, a foil composed

of a metal or the like may be contained. In other words, any other metal representing the packaging related information while being contained in the film roll 100 may be adopted as the identification medium 111.

Now refer to Fig. 6 which is a schematic diagram showing manufacturing steps of the film roll 100.

Fig. 6 (a) shows manufacturing steps of films themselves of the film roll 100, and Fig. 6 (b) shows steps of fabricating the film manufactured in Fig. 6 (a) under given conditions before conversion.

Firstly, in the manufacturing steps of films themselves shown in Fig. 6 (a), diverse films are produced according to their materials, compositions, thicknesses, and the like.

Among the materials of manufactured films are CPP (non-oriented polypropylene film), OPP (bi-oriented polypropylene film), PET (polyethylene terephthalate film), VMPET (aluminum-evaporated polyethylene terephthalate film), and PE (polyethylene film); besides there are various film compositions such as two-layered, three-layered, and five-layered film compositions depending on their use and the like, each of which varying in thickness and the like.

Next, a film manufactured in the manufacturing steps of films themselves of Fig. 6 (a) are supplied to the fabrication steps shown in Fig. 6 (b)

Firstly, a given print is made on part of the film

supplied to Fig. 6 (b), which is to be the surface of a given product. The printed film has anti-ultraviolet films and the like laminated thereon (laminate bonding) for preventing discoloration due to ultraviolet rays and the like. The laminated film is then wound around a paper material called a paper tube for each certain length (a length of 700 to 1000 m, for example).

The printed and laminated film is subsequently slit (cut) according to its fabrication procedures and slit conditions.

The film normally has a width of approximately 1000 mm, for example, and therefore in the fabrication steps of Fig. 6 (b), it is divided or cut (slit) at each 30 mm as the width for an actual product. In addition, in the fabrication steps, a fabrication condition and the like are recorded in the recording medium 110, and the recorded recording medium 110 is attached on the hollow core of the film roll 100.

Note that the recording medium 110 may be attached on the hollow core of the film roll 100 beforehand to record a fabrication condition and the like.

Fig. 7 is a block diagram showing the structure of the computer 1 provided inside the vertical pillow type bag forming and packaging apparatus 300 of the bag forming and packaging unit 12 of Fig. 1.

The computer 1 includes a CPU (Central Processing Unit)

500, an input/output device 501, a ROM (Read Only Memory) 502, a RAM (Random Access Memory) 503, a recoding medium reading device 302, and an external recording device 506.

The input/output device 501 transmits and receives information among other devices. The other devices here include the weighing unit 11 and inspector 13 of the product handling system shown in Fig. 1, weight checker 13a, seal checker 13b, metal detector 13c, X-ray inspector 13d, case packer (cardboard caser) 14, labeling unit 15, belt conveyors 16, 17, and the host computer (not shown) of the product handling system.

A system program is stored in the ROM 502. The recording medium reading device 302 reads and writes data to and from the recording medium 110. Parameters related to a bag forming and packaging program are recorded as data in the recording medium 110.

The external storage device 506, which is composed of a hard disc or the like, stores the bag forming and packaging program along with the parameters related to the bag forming and packaging program read from the recording medium 110. This bag forming and packaging program will later be detailed. The CPU 500 executes the bag forming and packaging program on the RAM 503 using the parameters stored in the external storage device 506. Then, the CPU 500 transmits a production result of the products produced and packaged using the bag

forming and packaging program to the host computer (not shown) through the input/output device 501, as will be described later.

Note that the bag forming and packaging program may be downloaded onto the external storage device 506 through a communication medium such as a communication line for execution on the RAM 503.

Now refer to Fig. 8 which is a diagram showing an example of the parameters recorded in the recording medium 110 of the film roll 100.

Fig. 8 (a) shows a product reservation list among the parameters recorded in the recording medium 110, and Fig. 8 (b) shows packaging conditions among the parameters recorded in the recording medium 110.

As shown in Fig. 8 (a), the product reservation list recorded in the recording medium 110 includes product identification NO. (product identification number), product name, bag length, bag width, number of products to be produced, film NO. (film number), and the like.

As shown in Fig. 8 (b), on the other hand, the packaging conditions recorded in the recording medium 110 include film NO. (film number), film feed, seal time, seal temperature (not shown), seal pressure (not shown), bag length (not shown), bag width (not shown), material thickness (not shown), manufacturing speed (not shown), product brand (not shown),

and fabrication condition.

In other words, the product reservation list includes all the necessary parameters for the manufacture of given products, and the packaging conditions include all the necessary parameters for the operation of the vertical pillow type bag forming and packaging apparatus 300.

An operator takes out packaging conditions for the vertical pillow type bag forming and packaging apparatus 300 using the film roll 100 having a given fabrication condition beforehand, and records the packaging conditions corresponding to each fabrication condition in the recording medium 110 of the film roll 100. The fabrication condition includes film material name, film composition, film thickness, film manufacturer name, fabrication converter name, fabrication procedures, fabrication line, fabrication time, laminate method, laminate procedures, laminate machine name, laminate time, laminate tension value, laminate temperature, slit conditions (left end, right end, center, etc.), aging conditions (temperature and time), fabrication manager, inspecting person, used adhesive manufacturer name, used adhesive grade, bonding speed, bonding drying temperature, amount of applied adhesive, print ink type, presence/absence of special color, presence/absence of a mixture ratio, used ink manufacturer name, used ink grade, product brand, product name, content, film unwinding

direction, special fabrication condition, and various barrier properties of oxygen, water vapor, etc.

The bag forming and packaging program will subsequently be described. Fig. 9 is a flowchart showing the operation of the computer 1 of the vertical pillow type bag forming and packaging apparatus 300 using the film roll 100 shown in Fig. 8.

As shown in Fig. 9, the computer 1 initially instructs the support shaft 301 of the vertical pillow type bag forming and packaging apparatus 300 to mount a film roll 100 around the support shaft 301 (Step S11). The operator fits a given film roll 100 into the support shaft 301 of the vertical pillow type bag forming and packaging apparatus 300 according to the instruction from the computer 1.

The computer 1 of the vertical pillow type bag forming and packaging apparatus 300 subsequently instructs the recording medium reading device 302 provided in the rotator 303 to read parameters recorded in the recording medium 110 of the film roll 100 (Step S12).

The computer 1 extracts a product reservation list and packaging conditions included in the read parameters to make the setting of the vertical pillow type bag forming and packaging apparatus 300 based on the extracted product reservation list and packaging conditions (Step S13).

The computer 1 of the vertical pillow type bag forming

and packaging apparatus 300 in the bag forming and packaging unit 12, subsequently instructs the operator to start the bag forming and packaging operation (Step S14). The operator starts the bag forming and packaging operation according to the instruction.

Then, the computer 1 determines whether or not the film of the film roll 100 remains (Step S15). For example, the computer 1 determines whether or not the film of the film roll 100 remains, by multiplying the current number of products that have been produced and packaged and the bag width, to compare the initial amount of the film of the film roll 100 and a multiplication result.

When determining that the film of the film roll 100 have run out, the computer 1 notifies the host computer via the input/output device 501 of Fig. 7 to use another film roll 100 (Step S16), and also returns to Step S11 to repeat the processes of Steps S11 to S15.

When, on the other hand, determining that the film of the film roll 100 remains, the computer 1 determines whether or not an abnormality is occurring (Step S17). When determining that an abnormality is occurring, the computer 1 instructs the operator to perform a given process for the abnormality (Step S18). Then, the computer 1 adds the abnormality information into the recording medium 110 for storage (Step S19).

When, on the other hand, determining that there is no abnormality, the computer 1 determines whether or not a designated amount of products have been produced (Step S20). Here, the computer 1 compares the number of products to be produced stored in the product reservation list among the parameters related to the bag forming and packaging program and the current number of products that have been produced to determine if the designated amount of products have been produced. When determining that the designated amount of products have not been produced, the computer 1 returns to Step S15 to repeat the processes of Steps S15 to S20.

When, on the other hand, determining that the designated amount of products have been produced, the computer 1 finishes the operation.

As described above, since in this embodiment the packaging conditions are recorded in the recording medium 110 attached on each film roll 100, optimum packaging conditions can be set in a short time at the time of exchange of film rolls 100, regardless of the skill of the operator. This prevents an unskilled operator from setting erroneous packaging conditions and producing additional time loss and film loss.

Furthermore, in the above product handling system, the number of products produced (packaging number) by the operator operating the bag forming and packaging device,

rejected pieces, operating time and the like can be transmitted momentarily to the host computer from the CPU 500 via the input/output device 501. As a result, it is possible to prevent delay in communicating the product result or errors in recited information and the like, which enables the manager to know the production result in real time.

In this embodiment, the recording medium 110, plate-like tag 110a, rod-like ID tag 110b, ring-like ID tag 110c, label 110d correspond to a recording medium, the metal powder 111a corresponds to an identification medium, the recording medium reading device 302 and identification medium reading device 305 correspond to a reading device, the vertical pillow type bag forming and packaging apparatus 300 corresponds to a packaging unit and a packaging machine, the RAM 503 and external recording device 506 correspond to a storage device, the manufacturing unit 10 for pieces to be packaged, weighing unit 11, bag forming and packaging unit 12, inspector 13, case packer 14, labeling unit 15, and belt conveyors 16, 17 correspond to a handling device.

In this embodiment, communication among other devices is enabled via the input/output device 501; however, the invention is not limited as such, and a DeviceNet Connection using other optional devices such as a network controller may be used or a packet communication via the telephone line or the like may be used.

In addition, in this embodiment the film roll has been described as an example of a roll of packaging material; however, the invention is not limited as such, and may similarly be applicable to a roll of packaging material wound with other kind of strip of packaging material for use in packaging products.

The recording medium 110 may be provided, for example on a roll of packaging material wound with a tape-shaped member called banner (JP 2002-8008 A) as a packaging material. The banner here refers to a tape-shaped member with a print of commercial advertisement or gift coupon thereon, which is attached on the outer surface of a bag.

The recording medium 110 may alternatively be provided on a roll of packaging material wound with a chuck tape (JP 6-32305 A) as a packaging material. The chuck tape here refers to a pair of strips of tapes integrated in mutual engagement, which is provided on an opening/closing portion of a bag.

The recording medium 110 may alternatively be provided on a roll of packaging material wound with a strip of tape attached on a notch of a bag so that it can be opened/sealed and re-opened/sealed (JP 11-255205 A), as a packaging material.

The recording medium 110 may also be provided on a roll of packaging material wound with a display carrier strip to which a plurality of packages are removably attached (JP

9-508879 A), as a packaging material.

Moreover, in this embodiment, the recording medium 110 is attached on the hollow core of the film roll 100; however, the invention is not limited as such, and the recording medium 110 may be embedded into the hollow core of the film roll 100.

Although the above-described embodiment has discussed a case in which the recording medium 110 is used on the hollow core of the film roll 100, the identification medium 111 may alternatively be used on the hollow core of the film roll 100 without being limited the case herein.

(Another Example of Bag Forming and Packaging Program)

Another example of the bag forming and packaging program will now be described. Fig. 10 is a diagram showing parameters related to a bag forming and packaging program which are recorded in the recording medium 110 of the film roll 100 and the computer 1 of the vertical pillow type bag forming and packaging apparatus 300.

Fig. 10 (a) shows a film identification number NO. (film identification number) and a fabrication condition which are parameters related to the bag forming and packaging program recorded in the recording medium 110, and Fig. 10 (b) shows packaging conditions among the parameters related to the bag forming and packaging program recorded beforehand in the computer 1 of the vertical pillow type bag forming and packaging apparatus 300.

The film identification NO. recorded in the recording medium 110 shown in Fig. 10 (a) is associated with the fabrication condition at the time of fabrication to be recorded. This film identification NO. is assigned to each film roll 100.

The operator finds packaging conditions of the vertical pillow type bag forming and packaging apparatus 300 beforehand using the film roll 100 with each fabrication condition, to store the packaging conditions for the film roll 100 of each fabrication condition into the ROM (Read Only Memory) 502 in the computer 1 of the vertical pillow type bag forming and packaging apparatus 300.

Another example of the bag forming and packaging program will subsequently be described.

Fig. 11 is a flowchart showing the operation of the computer 1 of the vertical pillow type bag forming and packaging apparatus 300 in the bag forming and packaging unit 12, using the film roll 100 shown in Fig. 10.

The operation of the computer 1 shown in Fig. 11 differs from that shown in Fig. 9 as follows.

As shown in Fig. 11, the computer 1 of the vertical pillow type bag forming and packaging apparatus 300 instructs the recording medium reading device 302 provided in the rotator 303 to read the film identification No. recorded in the recording medium 110 of the film roll 100 (Step S12a).

The computer 1 associates the read film identification NO. with packaging conditions having the corresponding film identification NO. (Step S12b). In other words, the computer 1 of the vertical pillow type bag forming and packaging apparatus 300 compares a plurality of film identification NOs. in the packaging conditions recorded beforehand and the read film identification NO., thereby selecting the corresponding packaging conditions to associate them with each other. Where the film identification NO. "5", for example, is recorded in the recording medium 110 shown in Fig. 10, the computer 1 associates it with the packaging conditions having the film NO. "5" recorded beforehand in the vertical pillow type bag forming and packaging apparatus 300.

The computer 1 makes the setting of the vertical pillow type bag forming and packaging apparatus 300 based on the packaging conditions included in the parameters related to the bag forming and packaging program (Step S13).

As described above, since in this embodiment the film roll identifier is recorded in the recording medium 110 attached on each film roll 100, optimum packaging conditions which are associated beforehand with the film roll identifier can be set in a short time at the time of exchange of film rolls 100, regardless of the skill of the operator. This prevents an unskilled operator from setting erroneous packaging conditions and producing additional time loss and

film loss.

Furthermore, in the above product handling system, the number of products produced (packaging number) by the operator operating the bag forming and packaging device, rejected pieces, operating time and the like can be transmitted momentarily to the host computer from the CPU 500 via the input/output device 501. As a result, it is possible to prevent delay in communicating the product result or errors in recited information and the like, which enables the manager to know the production result in real time.

In this embodiment, the recording medium 110 corresponds to a first storage device, the recording medium reading device 302 corresponds to a reading device, the vertical pillow type bag forming and packaging apparatus 300 corresponds to a packaging unit and a packaging machine, the RAM 503 and the external recording device 506 correspond to a storage device, the manufacturing unit 10 for pieces to be packaged, weighing unit 11, bag forming and packaging unit 12, inspector 13, case packer 14, labeling unit 15, and belt conveyors 16, 17 correspond to a handling device.

Although the use of the recording medium 110 has been discussed in the above-described example, the identification medium 111 may also be used without limited to the recording medium 110.

(Another Example of Bag Forming and Packaging Program)

Another example of the bag forming and packaging program will now be described. Fig. 12 is a diagram showing parameters related to a bag forming and packaging program recorded in the recording medium 110 of the film roll 100 and the computer 1 of the vertical pillow type bag forming and packaging apparatus 300.

Fig. 12 (a) shows a product identification number NO. (product identification number) and a fabrication condition which are parameters related to the bag forming and packaging program recorded in the recording medium 110, and Fig. 12 (b) shows packaging conditions among parameters related to the bag forming and packaging program recorded beforehand in the computer 1 of the vertical pillow type bag forming and packaging apparatus 300.

The product identification NO. recorded in the recording medium 110 shown in Fig. 12 (a) is associated with the fabrication condition at the time of fabrication to be recorded. This product identification NO. is assigned to each product to be produced.

The operator finds packaging conditions of the vertical pillow type bag forming and packaging apparatus 300 beforehand using the film roll 100 with each fabrication condition, to store the packaging conditions and the product reservation list for the film roll 100 of each fabrication condition into the ROM (Read Only Memory) 502 in the computer

1 of the vertical pillow type bag forming and packaging apparatus 300.

Fig. 13 is a flowchart showing the operation of the computer 1 of the vertical pillow type bag forming and packaging apparatus 300, using the film roll 100 shown in Fig. 12. The operation of the computer 1 shown in Fig. 13 differs from that shown in Fig. 9 or Fig. 11 as follows.

As shown in Fig. 13, the computer 1 of the vertical pillow type bag forming and packaging apparatus 300 instructs the recording medium reading device 302 provided in the rotator 303 to read the product identification NO. recorded in the recording medium 110 of the film roll 100 (Step S12c).

The computer 1 associates the read product identification NO. with a product reservation list having the corresponding product identification NO. (Step S12d). Then, the computer 1 associates the film identification NO. of the associated product reservation list with packaging conditions having the corresponding film identification NO. (Step S12e). In other words, the computer 1 of the vertical pillow type bag forming and packaging apparatus 300 compares the read product identification NO. and product identification NOs. in a plurality of product reservation lists recorded beforehand, for selection of the corresponding product reservation list to associate them with each other. Then, the computer 1 selects the packaging conditions having

the film identification NO. corresponding to that included in the associated product reservation list to associate them with each other.

When the product identification NO. "001", for example, is recorded in the recording medium 110 shown in Fig. 12, the computer 1 associates it with the product reservation list having the product identification NO. "001" from the product reservation lists recorded beforehand in the vertical pillow type bag forming and packaging apparatus 300. The computer 1 subsequently associates the film identification NO. "5" of the product reservation list having the product identification NO. "001" with the packaging conditions of the film identification NO. "5" from the packaging conditions recorded beforehand in the vertical pillow type bag forming and packaging apparatus 300.

The computer 1 makes the setting of the vertical pillow type bag forming and packaging apparatus 300 based on the packaging conditions included in the parameters related to the bag forming and packaging program (Step S13).

As described above, since in this embodiment the product identifier is stored in the recording medium 110 attached on each film roll 100, optimum packaging conditions associated beforehand with the product identifier can be set in a short time at the time of exchange of film rolls 100, regardless of the skill of the operator. This prevents an unskilled

operator from setting erroneous packaging conditions and producing additional time loss and film loss.

Furthermore, in the above product handling system, the number of products produced (packaging number) by the operator operating the bag forming and packaging device, rejected pieces, operating time and the like can be transmitted momentarily to the host computer from the CPU 500 via the input/output device 501. As a result, it is possible to prevent delay in communicating the product result or errors in recited information and the like, which enables the manager to know the production result in real time.

In this embodiment, the recording medium 110 corresponds to a recording medium, the recording medium reading device 302 corresponds to a reading device, the vertical pillow type bag forming and packaging apparatus 300 corresponds to a packaging unit and a packaging machine, the RAM 503 and the external recording device 506 correspond to a storage device, the manufacturing unit 10 for pieces to be packaged, weighing unit 11, bag forming and packaging unit 12, inspector 13, case packer 14, labeling unit 15, and belt conveyors 16, 17 correspond to a handling device.

Although the use of the recording medium 110 has been discussed in the above-described example, the identification medium 111 may also be used without limited to the recording medium 110.

(Another Example of Bag Forming and Packaging Program)

Another example of the bag forming and packaging program will now be described. Fig. 14 is a diagram showing another example of parameters related to a bag forming and packaging program recorded in the recording medium 110 of the film roll 100. The parameters related to the bag forming and packaging program shown in Fig. 14 differ from those shown in Fig. 8 as follows.

Fig. 14 (a) shows a product reservation list among the parameters related to the bag forming and packaging program recorded in the recording medium 110, Fig. 14 (b) shows packaging conditions among the parameters related to the bag forming and packaging program recorded in the recording medium 110, and Fig. 14 (c) shows peripheral device instruction information including setting conditions for the peripheral devices recorded in the recording medium 110.

As shown in Fig. 14 (c), the peripheral device instruction information recorded in the recording medium 110 include such information as weighing device information for the weighing apparatus 200 in the weighing unit 11, weight check information for the weight checker 13a in the inspector 13, seal check information (not shown) for the seal checker 13a in the inspector 13, metal detection information (not shown) for the metal detector 13b in the inspector 13, X-ray inspection information (not shown) for the X-ray

inspector 13c in the inspector 13, operation information (not shown) for the belt conveyors 16, 17, case packing information for the case packer 14, and labeling information for the labeling unit 15.

Fig. 15 is a flowchart showing the operation of the computer 1 of the vertical pillow type bag forming and packaging apparatus 300, using the film roll 100 shown in Fig. 14. The operation of the computer 1 shown in Fig. 14 differs from that shown in Fig. 9 as follows.

The computer 1 of the vertical pillow type bag forming and packaging apparatus 300 instructs the recording medium reading device 302 provided in the rotator 303 to read the parameters related to the bag forming and packaging program and the peripheral device instruction information recorded in the recording medium 110 of the film roll 100 (Step S12f).

The computer 1 transmits the read peripheral device instruction information to the peripheral devices (Step S12g). The computer 1 subsequently extracts a product reservation list and packaging conditions included in the read parameters related to the bag forming and packaging program to make the setting of the vertical pillow type bag forming and packaging apparatus 300 based on the extracted product reservation list and packaging conditions (Step S13).

As described above, in this embodiment the operator is not required to input such setting conditions as the weighing

device information for one or more production devices such as the weighing apparatus 200 in the weighing unit 11 which produce products together with the bag forming and packaging machine. This prevents wasteful time losses due to errors in the setting conditions made by the operator and the like.

Moreover, since the record can be made of abnormality information on the bag forming and packaging device, the manager is able to grasp a trouble occurring situation, and also to easily pursue the cause of a trouble.

Furthermore, in the above product handling system, the number of products produced (packaging number) by the operator operating the bag forming and packaging device, rejected pieces, operating time and the like can be transmitted momentarily to the host computer from the CPU 500 via the input/output device 501. As a result, it is possible to prevent delay in communicating the product result or errors in recited information and the like, which enables the manager to know the production result in real time.

In this embodiment, the recording medium 110 corresponds to a recording medium, the recording medium reading device 302 corresponds to a reading device, the vertical pillow type bag forming and packaging apparatus 300 corresponds to a packaging unit and a packaging machine, the RAM 503 and the external recording device 506 correspond to a storage device, the manufacturing unit 10 for pieces to be

packaged, weighing unit 11, bag forming and packaging unit 12, inspector 13, case packer 14, labeling unit 15, and belt conveyors 16, 17 correspond to a handling device.

Although the use of the recording medium 110 has been discussed in the above-described example, the identification medium 111 may also be used without limited to the recording medium 110.

(Another Example of Film Roll)

Figs. 16 (a) and (b) show another example of a film roll 100 having a recording medium 110 attached thereon.

Referring to Fig. 16 (a), the recording medium 110 is attached near an end of the outermost periphery of the film roll 100a. In this case, data recorded in this recording medium 110 is read by the recording medium reading device 302 provided in the vertical pillow type bag forming and packaging apparatus 300. Alternatively, at the time of exchange of a used film roll 100a for a new one, the operator may read the data recorded in the recording medium 110 using the recording medium reading device 302.

Now referring to Fig. 16b, the recording medium 110 is attached on, for example a tape for affixing an end of the outermost periphery of the film roll 100b onto the film roll 100b. In this case, the data recorded in this recording medium 110 is read by the recording medium reading device 302 provided in the vertical pillow type bag forming and packaging

apparatus 300. Alternatively, at the time of exchange of a used film roll 100b for a new one, the operator may read the data recorded in the recording medium 110 using the recording medium reading device 302.

Although in Fig. 16a and Fig. 16b the recording medium 110 is being attached on the film roll, the invention is not limited as such, and the recording medium 110 may be printed on a film roll or may be printed on, for example, an affixing tape. In addition, as for the recording medium 110, the plate-like tag 110a, rod-like ID tag 110b, ring-like ID tag 110c, label 110d used in the first to five techniques may instead be used. Instead of the recording medium 110, the identification medium 111 may be used. The metal powder 111a, for example, may be used as the identification medium 111. In this embodiment, the recording medium 110 corresponds to a recording medium and a sheet-like member.